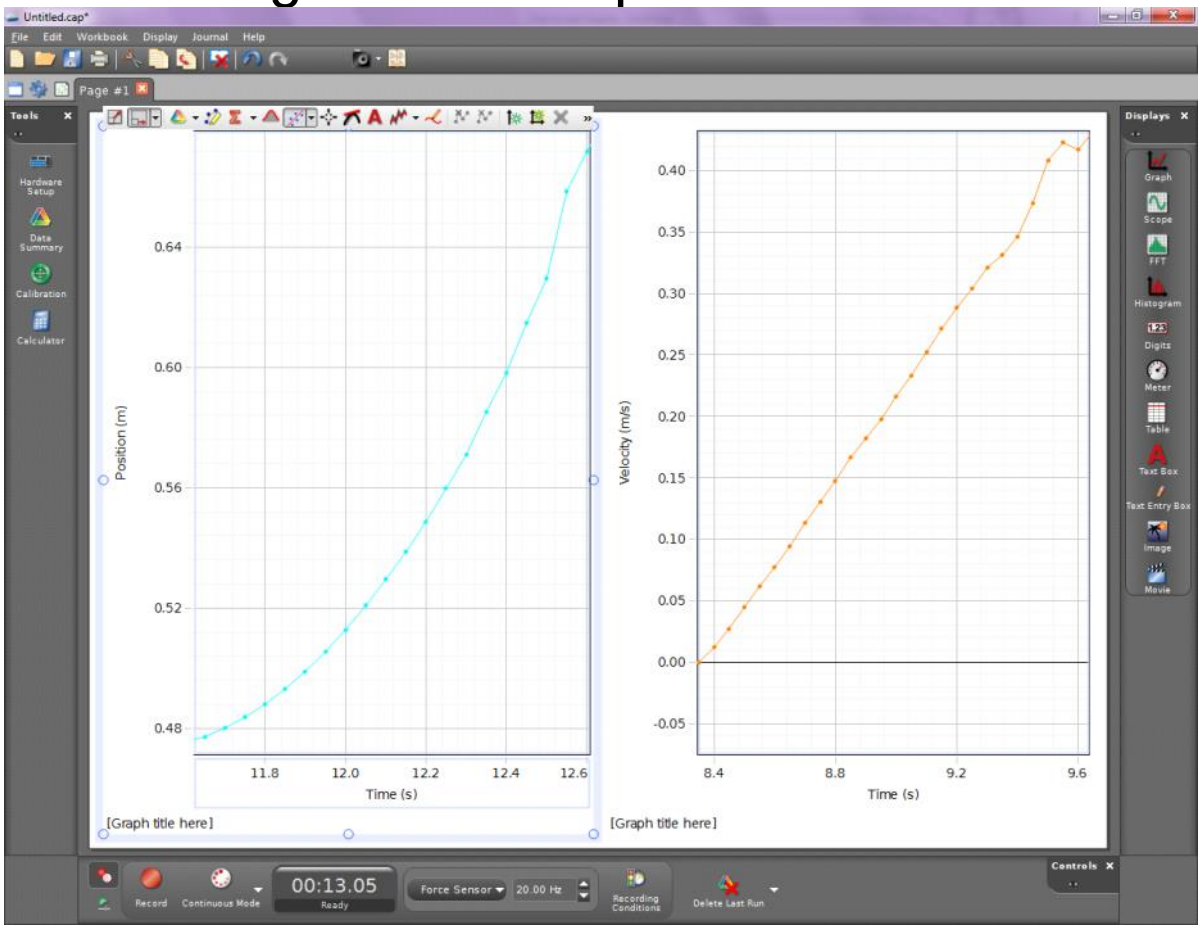
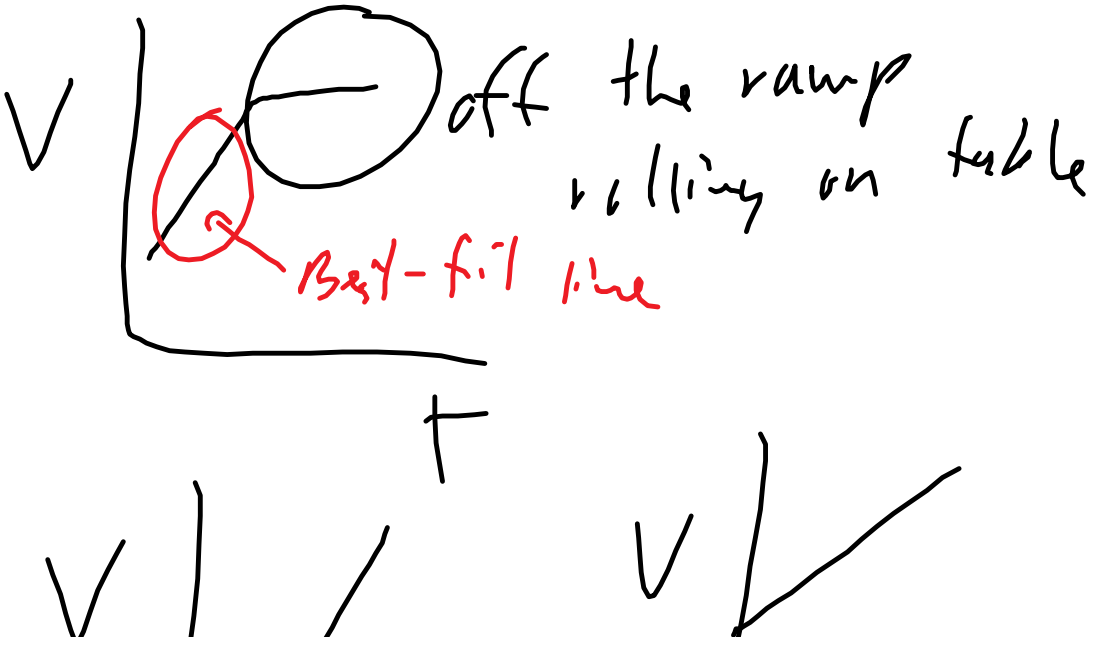
Check Lab Graphs
Derive Equations
problem solving techniques
Quiz next class and lab.
Cart rolling down a slope





labbook p23 - answer questions
- conclusion
- source of uncertainty/ies

uniform acceleration
acceleration is rate of change in velocity
$a=\Delta v/\Delta t$
it is a vector - has direction
units: m/s^2

if the acceleration is uniform
$a = (v_f-vi)/t$ or
$at = v_f-vi$
$v_f = at + v_i$

area under the v-t graph is displacement, d.
$d= 1/2 (v_i+v_f)t = v_{avg}t$

what if we want to solve a problem that doesn't give v_f?
eg. A ball rolls at 3.0 m/s^2 down a slope. If it starts at 2.0 m/s how far does it travel in 4.0s?
what are your givens?
$v_i=2.0m/s$ $t=4.0s$ $a=3.0m/s^2$ $d=?$

v_i=2.0m/s t = 4.0s a=3.0m/s^2 d=?

We can sub the first equation into the second equation to derive a new equation.

$d = 1/2\ (v_i+v_f)t$ and $v_f = at + v_i$

$d = 1/2\ (v_i + at + v_i)t$ simplify

$d = 1/2\ v_it + 1/2at^2 + 1/2v_it$

$d = v_it + 1/2at^2$

$d = (2x4)+(0.5x3x(4x4))=32$ m

What if you don't have time?

$d = 1/2\ (v_i+v_f)t$ and $v_f = at + v_i$
how do we get rid of time?

$t = 2d/(v_i+v_f)$

$v_f = a[2d/(v_i+v_f)] + v_i$

$v_f - v_i = 2ad/(v_i+v_f)$

$(v_f - v_i)\ (v_i+v_f) = 2ad$

$v_fv_i + v_f^2 - v_i^2 - v_iv_f = 2ad$

$v_f^2 - v_i^2 = 2ad$

$v_f^2 = 2ad + v_i^2$ ← given

$d = v_i t + 1/2 a t^2$

$d = 1/2 (v_i + v_f) t$

$v_f = at + v_i$

steps for solving problems:
write out givens - 0.5 marks
write out equation relating givens - 0.5 marks
sub in and solve - 0.5 marks
correct units and sig figs - 0.5marks

eg. A car is moving at 20.0 m/s and hits the brakes to stop. If the acceleration of the car is -8.0 m/s^2, what is

a) stopping distance?
b) time to stop

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